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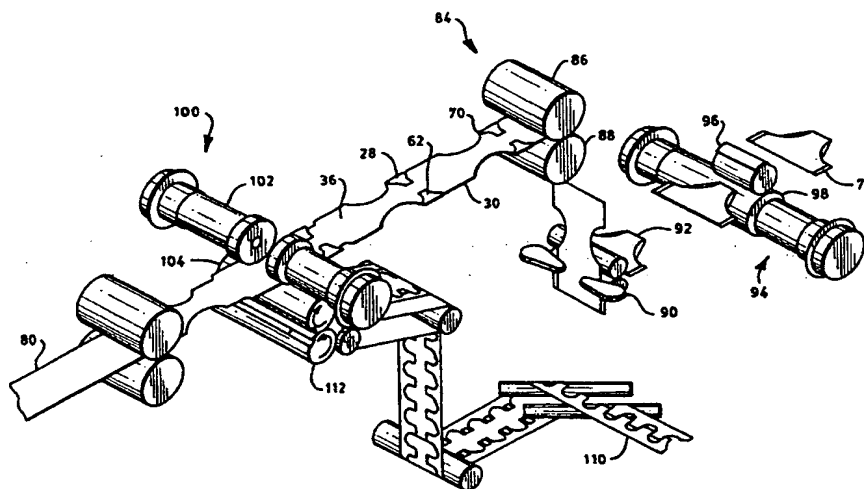
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US99/01061 <b>(22) International Filing Date:</b> 19 January 1999 (19.01.99) <b>(30) Priority Data:</b> 09/100,825      19 June 1998 (19.06.98)      US <b>(71) Applicant:</b> KIMBERLY-CLARK WORLDWIDE, INC. [US/US]; 401 North Lake Street, Neenah, WI 54956 (US). <b>(72) Inventor:</b> MCNICHOLS, Patrick, Sean; N2426 Greenville Road, Hortonville, WI 54944 (US). <b>(74) Agents:</b> CURTIN, Jeffrey, B. et al.; Kimberly-Clark World- wide, Inc., 401 North Lake Street, Neenah, WI 54956 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** METHOD OF MAKING AN ABSORBENT ARTICLE WITH PREFASTENED SIDE PANELS AND ABSORBENT ARTICLES MADE BY THE SAME

**(57) Abstract**

A method of making a prefastened disposable absorbent article includes providing a continuous web (80) of interconnected absorbent articles and releasably attaching a pair of opposed side panels (28) to one of the waist regions on each of the absorbent articles. Each of the opposed side panels (28) includes a primary fastener which releasably engages the one waist region to provide the releasable attachment. Each of the side panels (28) also defines side portions which extend laterally outward beyond the side edges of the absorbent article in the one waist region. The continuous web (80) is selectively cut into discrete absorbent articles which are then folded about a fold line extending in a lateral direction through the crotch region of the article thereby positioning the waist regions of the article in a facing relationship. The method further includes securing the side portions of the side panels (28) to the side edges of the absorbent article in the opposite waist region to provide the prefastened absorbent article.

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METHOD OF MAKING AN ABSORBENT ARTICLE WITH PREFASTENED SIDE  
PANELS AND ABSORBENT ARTICLES MADE BY THE SAME

Field of the Invention

The present invention relates to disposable absorbent articles which are adapted to contain body exudates. More particularly, the present invention relates to methods of making absorbent articles having prefastened side panels and absorbent articles made by the same.

Background of the Invention

- 10 It is desired that absorbent articles such as diapers, training pants or incontinence garments provide a close, comfortable fit about the wearer and contain body exudates. Moreover, it is desirable that such absorbent articles, after being soiled, can be removed from the wearer in a convenient and clean manner without undesirably soiling the care giver or surrounding area such as the clothes of the wearer. In certain circumstances, it is
- 15 also desirable that such absorbent articles are capable of being pulled up or down over the hips of the wearer to allow the wearer or caregiver to easily pull the article on and easily remove the article if it has not been soiled. For example, such absorbent articles can assist in the toilet training of children.
- 20 Conventional diapers have typically included a front waist portion and a back waist portion which are releasably connected about the hips of the wearer during use by conventional fasteners such as adhesive tape fasteners or hook and loop type fasteners. For example, the conventional fasteners have typically included a pair of fasteners, such as adhesive tape tabs, located on the outermost corners of the diaper in the back waist region of the
- 25 diaper and a complimentary fastener, such as a taping panel, located on the outer surface of the outer cover of the diaper in the front waist portion of the diaper. In such a configuration, the diaper has been positioned between the legs of the wearer and the adhesive tape tabs have been releasably attached to the taping panel to secure the back waist portion to the front waist portion of the diaper to secure the diaper about the waist of
- 30 the wearer. Such conventional diapers are easy to fasten about and remove from the

wearer after use without undesirably soiling the care giver. However, such conventional diapers are not provided in a prefastened configuration and thus are not configured to be pulled up or down over the hips of the wearer when the fasteners are attached.

- 5 Several attempts have been made to provide absorbent articles which effectively contain body exudates, are capable of being pulled up or down over the hips of the wearer and provide ease of cleaning and removal after being soiled. For example, some conventional absorbent articles, such as conventional training pants, have included integral side panels which connect the front waist portion to the back waist portion of the absorbent article.
- 10 The side panels have been made stretchable such that the waist opening of the absorbent article can expand to allow the absorbent article to be pulled up or down over the hips of the wearer if desired. Such side panels have also been designed such that they may be torn to remove the training pant from the wearer after it has been soiled.
- 15 However, many of such attempts have not been completely satisfactory. For example, absorbent articles such as training pants have not always been able to achieve a close conforming fit to the wearer while still being able to expand enough to be pulled up and down over the hips of the wearer. Often such training pants fit the waist of the wearer loosely which can undesirably result in leaks. As a result, many of such articles have not
- 20 contained bodily exudates as effectively as conventional diaper-type articles which can be adjusted to achieve a more conforming fit to the wearer. Moreover, the removal of soiled absorbent articles which have integral side panels, such as conventional training pants, has not always been completely satisfactory. For example, the side panels have been difficult to tear when attempting to remove the article from the waist of the wearer instead
- 25 of pulling the article down over the hips of the wearer.

Accordingly, despite the attempts to develop improved absorbent articles, there remains a need for absorbent articles which can provide the benefits of conventional training pants and conventional diapers. That is, there remains a need for absorbent articles which

30 conform to the wearer to effectively contain bodily exudates, which are capable of being pulled up and down over the hips and buttocks of the wearer without opening, and which are readily secured about and removed from the wearer in a convenient and clean manner. Moreover, there is a need for improved methods of reliably and consistently making such absorbent articles.

Summary of the Invention

In response to the difficulties and problems discussed above, new methods of making a  
5    prefastened disposable absorbent articles which have an adjustable fastening system  
have been discovered. In one aspect, the present invention concerns a method of making  
a prefastened disposable absorbent article which includes providing a continuous web of  
interconnected absorbent articles, releasably attaching a pair of opposed side panels to  
one of the waist regions on each of the interconnected absorbent articles, selectively  
10   cutting the continuous web into discrete absorbent articles, folding each of the discrete  
absorbent articles thereby positioning the waist regions in a facing relationship; and  
securing side portions of the side panels to the side edges of the article in the opposite  
waist region to provide the prefastened absorbent article. Each of the opposed side  
panels includes a primary fastener thereon which releasably engages the one waist region  
15   to provide the releasable attachment. Each of the side portions of the side panels  
extends laterally outward beyond the side edges of the absorbent article in the one waist  
region for securement to the side edges of the opposite waist region.

In another aspect, the present invention concerns a method of making a prefastened  
20   disposable absorbent article which defines a front waist region, a back waist region, a  
crotch region which extends between and connects the waist regions, a pair of opposed  
side edges and a pair of opposed waist edges. The method comprises the steps of:  
a) providing a continuously moving web of outer cover material;  
b) intermittently connecting multiple absorbent chassis to the outer cover material  
25   to provide a continuously moving web of interconnected absorbent articles each of which  
includes one of the absorbent chassis;  
c) releasably attaching a pair of opposed side panels to the front waist region on  
each of the absorbent articles wherein each of the opposed side panels includes a  
primary fastener thereon which releasably engages an outer surface of the absorbent  
30   article in the front waist region and wherein each of the side panels defines side portions  
which extend laterally outward beyond the side edges of the absorbent article in the front  
waist region;

d) releasably bonding the side panels to the front waist region to assist the primary fasteners in providing the releasable attachment of the side panels to the front waist region;

5 e) selectively cutting the continuous web of interconnected absorbent articles into discrete absorbent articles;

f) folding each of the discrete absorbent articles about a fold line extending in a lateral direction through the crotch region of the absorbent article thereby positioning the waist regions of the absorbent article in a facing relationship; and

10 g) securing the side portions of the side panels to the side edges of the absorbent article in the back waist region to provide the prefastened absorbent article.

In yet another aspect, the present invention concerns a prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects the waist regions, a pair of opposed side edges and a pair  
15 of opposed waist edges. The absorbent article includes a pair of opposed side panels which define side portions which are attached to the laterally opposed side edges of the back waist region of the absorbent article. The side panels include a primary fastener located thereon which releasably engages an outer surface of the absorbent article in the front waist region to provide the prefastened absorbent article. The absorbent article also  
20 includes a pair of releasable side bonds which are located on the side panels between the primary fastener and the side portion. The releasable side bonds releasably connect the side panels to the front waist region to assist the primary fasteners in maintaining the prefastened absorbent article in a prefastened condition.

25 In still another aspect, the present invention concerns a prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects the waist regions, a pair of opposed side edges and a pair of opposed waist edges. The absorbent article includes a pair of opposed side panels which define side portions which are attached to the laterally opposed side edges of the  
30 back waist region of the absorbent article. The side panels include a primary fastener located thereon which releasably engages an outer surface of the absorbent article in the front waist region to provide the prefastened absorbent article. The prefastened absorbent article is made by a process which includes:

a) releasably engaging the primary fastener on each of the opposed side panels to the outer surface of the absorbent article in the front waist region;

b) folding the absorbent article about a fold line extending in a lateral direction through the crotch region of the absorbent article thereby positioning the waist regions in a facing relationship; and

c) securing the side portions of the side panels to the side edges of the absorbent article in the back waist region to provide the prefastened absorbent article.

The present invention advantageously provides methods of making prefastened disposable absorbent articles which include an adjustable fastening system for improved fit and performance and absorbent articles made by the same. In particular, the present invention provides methods of attaching prefastened side panels to and folding a disposable absorbent articles in a reliable and consistent manner. The absorbent articles of the present invention are capable of being reliably pulled up or down over the hips of the wearer to assist in the toilet training of the wearer similar to conventional training pants. Moreover, similar to conventional diapers, the absorbent articles of the present invention can advantageously be applied to and removed from the wearer after they have been soiled with relative ease and cleanliness.

#### Brief Description of the Drawings

The present invention will be more fully understood and further advantages will become apparent when reference is made to the following detailed description of the invention and the accompanying drawings wherein like numerals represent like elements. The drawings are merely representative and are not intended to limit the scope of the appended claims.

Fig. 1 representatively shows a schematic view of an example of a method of making a prefastened disposable absorbent article according to the present invention;

Fig. 2 representatively shows a plan view of the steps involved in the method of Fig 1;

Fig. 3 representatively shows a side view of an example of a prefastened disposable absorbent article made according to the methods of the present invention;



Fig. 4 representatively shows a plan view of the disposable absorbent article of Fig. 3 in an unfastened, stretched and laid flat condition with the surface of the article which contacts the wearer facing the viewer; and

- 5 Fig. 5 representatively shows a plan view of the disposable absorbent article of Fig. 3 in an unfastened, stretched and laid flat condition with the surface of the article which contacts the wearer's clothing facing the viewer.

#### Detailed Description of the Invention

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The present invention concerns methods of making prefastened disposable absorbent articles which are configured to closely conform to the body of the wearer to effectively contain body exudates while being capable of being pulled up or down over the hips and buttocks of the wearer and prefastened absorbent articles made according to the same.

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The prefastened disposable absorbent articles can also be easily secured to and removed directly from the waist of the wearer. As such, the prefastened absorbent articles of the present invention can function in a similar manner to conventional training pants when left in the prefastened configuration or they can be unfastened prior to or during use to function in a manner similar to conventional diapers. The disposable absorbent articles

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are adapted to be worn adjacent to the body of a wearer to absorb and contain various exudates discharged from the body. As used herein, the term "disposable" refers to articles which are intended to be discarded after a limited use and which are not intended to be laundered or otherwise restored for reuse.

25

The methods of making the disposable absorbent articles and the articles made by the same of the present invention will be described in terms of a disposable diaper article which is adapted to be worn by infants about the lower torso. In particular, the methods will be described in terms of a method of making a prefastened disposable absorbent diaper having prefastened side panels. It is understood that the methods of the present

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invention are equally adaptable for use in making other types of absorbent articles such as adult incontinent products, training pants, feminine hygiene products, other personal care or health care garments, and the like.

Figs. 1 and 2 representatively illustrate an example of a method of making a prefastened disposable absorbent article according to the present invention. Fig. 3 further representatively illustrates an example of a prefastened disposable diaper, as generally indicated at 20, made according to the methods of the present invention. Figs. 4 and 5 representatively illustrate the prefastened diaper of Fig. 3 in an unfastened, stretched and laid flat configuration. As illustrated in Figs. 3-5, the diaper 20 defines a front waist region 22, a back waist region 24, a crotch region 26 which extends between and connects the front and back waist regions 22 and 24 and a pair of laterally opposed side panels 28. The diaper 20 further defines a pair of laterally opposed side edges 30, a pair of longitudinally opposed waist edges 32, an interior surface 34 which is configured to contact the wearer, an outer surface 36 opposite the interior surface 34, a longitudinal direction 38 and a lateral direction 40.

The front waist region 22 comprises the portion of the diaper 20 which, when worn, is positioned on the front of the wearer while the back waist region 24 comprises the portion of the diaper 20 which, when worn, is positioned on the back of the wearer. The crotch region 26 of the diaper 20 comprises the portion of the diaper 20 which, when worn, is positioned between the legs of the wearer and covers the lower torso of the wearer. The side panels 28 comprise the portions of the diaper which, when worn, are positioned on the side hip regions of the wearer. The laterally opposed side edges 30 of the diaper 20 generally define leg openings which may be curvilinear. The waist edges 30 of the diaper 20 are configured to encircle the waist of the wearer when worn and provide a waist opening when fastened which defines a waist perimeter dimension.

The illustrated diaper 20 includes an outer cover 42, an absorbent chassis 44 and a fastening system 60. The fastening system 60 includes a pair of primary fasteners 62 and a pair of laterally opposed releasable side bonds 64 located on the side panels 28 of the diaper 20. The absorbent chassis 44 is configured to contain and/or absorb any body exudates discharged from the wearer. Whereas, the outer cover 42, primary fasteners 62 and releasable side bonds 64 are configured to maintain the diaper 20 about the waist of the wearer, conceal the absorbent chassis 44 from view, and provide a garment-like appearance. The diaper 20 may further include leg elastics 52, containment flaps 54 and waist elastics 56 as are known to those skilled in the art. It should be recognized that

individual components of the diaper 20 may be optional depending upon the intended use of the diaper 20.

5 The methods of the different aspects of the present invention are directed at reliably and consistently providing prefastened disposable absorbent articles such as that representatively illustrated in Fig. 3. For example, as representatively illustrated in Figs. 1 and 2, the methods can include providing a continuous web of interconnected diapers 80 moving in the direction indicated by arrow 82. In such a configuration, the front waist region 22 of the leading diaper 20 may be connected to the back waist region 24 of the  
10 trailing diaper 20 to form the continuous web of interconnected diapers 80. Alternatively, the back waist region 24 of the leading diaper may be connected to the front waist region 22 of the trailing diaper or the diapers may be arranged in a front-to-front/back-to-back relationship.

15 The continuous web of interconnected diapers 80 may be provided by means known to those skilled in the art. For example, a web of interconnected diapers 80, such as the diaper illustrated in Fig. 3, may be provided by first providing a continuously moving web of material for the outer cover 42. Individual absorbent chassis 44 for each diaper 20 may then be intermittently connected to the continuously moving web of outer cover material at  
20 spaced apart locations. Additional components, such as the leg elastics 52, containment flaps 54 and waist elastics 56, may also be connected to the continuously moving web of outer cover material or the individual absorbent chassis connected thereto to provide the web of interconnected diapers 80. The different components of the diaper 20 may be connected together by means known to those skilled in the art such as, for example,  
25 adhesive, thermal or ultrasonic bonding. Desirably, most of the components are connected using ultrasonic bonding for improved manufacturing efficiency and reduced raw material cost.

30 As illustrated in Fig. 1, a pair of laterally opposed side panels 28 having primary fasteners 62 attached thereto are also releasably attached to one of the waist regions 22 and 24 of each diaper 20 on the continuously moving web of interconnected diapers 80. The side panels 28 are releasably attached to each diaper 20 by releasably engaging the primary fasteners 62 with the outer surface 36 of each diaper 20 in the respective waist region 22 or 24. For example, as representatively illustrated in Figs. 1 and 2, the primary

- fasteners 62 located on each of the laterally opposed side panels 28 may be releasably engaged with the outer surface 36 of the diaper 20 in the front waist region 22 of the diaper 20. Alternatively, the fasteners 62 located on the side panels 28 may be releasably engaged with the outer surface 36 of the diaper in the back waist region 24. As discussed below, each diaper 20 may include an attachment panel 66 located on the outer cover 42 to which the primary fasteners 62 releasably engage. Alternatively, the primary fasteners 62 may releasably engage the outer cover 42 of the diaper 20 directly without requiring an separate fastening panel.
- 10 When the primary fasteners 62 have been releasably engaged with the outer surface 36 of the diaper 20, the laterally opposed side panels 28 define side portions 70 which extend in the lateral direction 40 outward beyond the opposed side edges 30 of the diaper 20 in the respective waist region 22 or 24. For example, as illustrated in Fig. 2, the opposed side panels 28 may define side portions 70 which extend laterally beyond the side edges 30 of the diaper 20 in the front waist region 22. In such a configuration, the side portions 70 are configured to be secured to the side edges 30 of the diaper 20 in the back waist region 24 to provide the prefastened diaper 20. Desirably, the side portions 70 of the side panels 28 extend outward beyond the side edges 30 a distance of at least about 0.5 centimeters and more desirably at least about 1.0 centimeters in the lateral direction 40. Such distance provide sufficient material for securement to the side edges 30 of the diaper 20 in the opposite waist region. To facilitate the attachment of the side portions 70 of the side panels 28 to the opposite waist region 22 or 24, it is desirably that the waist region to which the primary fasteners are releasably engaged defines a width in the lateral direction 40 which is smaller than the width of the opposite waist region in the lateral direction 40. For example, in the illustrated embodiments, it is desired that the width of the front waist region 22 be smaller than the width of the back waist region 24 such that the side portions 70 of the side panels 28 are in a facing relationship with the side edges 30 of the diaper 20 in the back waist region 24 for improved manufacturing.
- 30 The laterally opposed side panels 28 may be supplied by means known to those skilled in the art. For example, as illustrated in Fig. 1, two webs of spaced apart, interconnected side panels 110 having the primary fasteners 62 attached thereto may be provided. The webs of side panels may then be passed through the slip cutter 112 which intermittently cuts the respective webs of side panels 110 into discrete side panels 28. The primary

fasteners 62 on each discrete side panel 28 are then intermittently releasably engaged with the outer surface 36 of each diaper at spaced apart locations along the side edges 30 of each diaper on the web of interconnected diapers 80. The releasable engagement of the fasteners 62 with the outer surface 36 of the diaper 20 may be ensured by passing the fasteners 62 and web 80 between a pair of rotating nip rolls (not shown) which apply pressure to between the fasteners 62 and outer surface 36.

As illustrated in Figs. 1 and 2, the opposed side panels 28 may further be releasably bonded to the outer surface 36 of the diaper 20 to assist the primary fasteners 62 in maintaining the side panels 28 releasably attached to the diaper 20. Such releasable bonds may be provided by passing the diaper 20 through bonder 100, as illustrated in Fig. 1. For example, bonder 100 may be configured to releasably bond the section of the side panels 28 between the primary fasteners 62 and the side portions 70 to the outer surface 36 of the diaper 20 in the front waist region 22 at bond points 64, as representatively illustrated in Fig. 2. The term "releasably bond" as used herein refers to a bond which has a relatively low peel strength such that the bond can be broken by the caregiver if desired to assist in removing the diaper 20 from the wearer without tearing or severely damaging the other portions of the diaper 20. The releasable bonds may otherwise be broken prior to applying the diaper 20 to the wearer if it is desired to apply the prefasted diaper of the invention in a similar manner to conventional diapers. The specific values of the desired peel strength of the bond are set forth herein in conjunction with the detailed description of the diaper 20 illustrated in Figs. 3-5.

The releasable bonds 64 assist in maintaining the diaper 20 in the prefasted configuration while it is being pulled on or off over the hips of the wearer. The releasable bonds 64 further help maintain the side panels 28 in alignment until they are permanently secured to the opposite waist region of the diaper 20 after the diaper 20 is folded. The releasable side bonds 64 also provide improved hip coverage and prevent rollover or folding of the side edges 30 and waist edges 32 of the prefasted diaper 20 as it is pulled over the wearers hips. Such prevention of rollovers and foldovers can reduce the level of contact between the fasteners and the skin of the wearer which can desirably result in reduced skin irritation and redness.

As shown in Figs. 1 and 2, the releasable side bonds 64 are located laterally outward of the primary fasteners 62 on the side panels 28 when the side panels 28 are releasably attached to the outer surface 36 of the diaper 20. As used herein, the term "outward" refers to a distance in the lateral direction 40 away from a longitudinal centerline of the diaper 20. In such a configuration, the releasable side bonds 64 connect a section of each side panel 28 laterally outward of the primary fasteners 62 to the outer surface 36 of the diaper 20. Desirably, the releasable side bonds 64 connect the side panels 28 to the side edges 30 of the front waist region 22. For example, as illustrated, the releasable side bonds 64 may releasably bond the longitudinally opposed edges of the side panels 28 to the side edges 30 of the front waist region 22. In such a configuration, the releasable bonds 64 also assist in preventing the side and waist edges 30 and 32 of the diaper 20 from rolling over as the diaper 20 is pulled on or taken off.

When the side panels 28 are releasably attached to the outer surface 36 of the diaper 20 as illustrated in Fig. 2, the releasable side bonds 64 are located on the side panels 28 laterally outward from the primary fastener 62 a distance 68 to prevent relative movement or shifting between the side panels 28 and the front and back waist regions 22 and 24 when the diaper 20 is being used. In a particular embodiment, at least a portion of each of the releasable side bonds 64 is located on the side panels 28 laterally outward from the primary fasteners 62 a distance 68 of at least about 1.0 centimeters and desirably at least about 2.0 centimeters. When the distance 68 is less than the values set forth above, the side panels 28 and front and back waist regions 22 and 24 may undesirably shift with respect to each other during the application or use of the diaper 20. Such shifting may adversely affect the fit of the diaper 20 on the wearer which can undesirably lead to increased leakage.

Suitable bonding equipment which can be used to provide the releasable bonds 64 is well known to those skilled in the art. Desirably, the bonder 100 is an ultrasonic bonder for improved efficiency and cost effectiveness. For example, as illustrated in Fig. 1, the bonder 100 may include one or more rotary ultrasonic horns 102 and an anvil roll 104 between which the web of diapers 80 is passed to provide the releasable bonds 64. Suitable rotary ultrasonic horns are described in U.S. Patent No. 5,110,403 to Ehlert, the disclosure of which is hereby incorporated by reference. Such rotary ultrasonic horns 102 generally have a diameter of from about 5 to about 20 centimeters and a width of from

about 2 to about 15 centimeters. Alternatively, the ultrasonic horn 102 may be a stationary ultrasonic horn as are also known to those skilled in the art. Other suitable ultrasonic horns and ultrasonic bonders are commercially available from Branson Sonic Power Company, a business having offices in Danbury, Connecticut. The bonder 100  
5 could otherwise be a thermal or adhesive bonder as are known to provide the releasable bonds 64.

The bonder 100 may be configured to provide the releasable bonds 64 in a variety of patterns and shapes or sizes. For example, the releasable bonds 64 may be provided as  
10 a pattern of points, dots, circles, squares, triangles and the like which may be arranged in a linear or nonlinear configuration. In the illustrated embodiments, such patterns may be located on the bonding horn 102 or the anvil roll 104. Desirably, the pattern is located on the anvil roll 104 for improved manufacturing efficiency.

15 The continuous web of interconnected diapers 80 is passed through cutter 84 which selectively cuts the web 80 into discrete, individual diapers 20. Such cutters are generally known to those skilled in the art and may include, for example, the combination of a cutting roll 86 and anvil roll 88 through which the web 80 travels. The anvil roll 88 may include a hardened steel rotating roll while the cutting roll 86 may include one or more  
20 flexible hardened steel blades clamped on to another rotating roll. The pinching force between the blade on the cutting roll and the anvil roll creates the cut. The cutting roll 86 may have one or more blades depending upon the desired distance between the cuts. The cutter 84 may further be configured to provide a spacing between the individual cut pieces after they are cut. Such a spacing can be provided by transferring the cut pieces  
25 away from the cutter at a higher speed than the speed at which the web is provided to the cutter. For example, slip cutter 112 is desirably configured in such a manner.

The discrete diapers 20 are then folded in a conventional blade folder 90 about fold line 92 on the diaper 20. As such, the waist regions 22 and 24 of each diaper are  
30 positioned in a facing relationship with the side portions 70 of the side panels extending laterally outward beyond the side edges 30 of the diaper 20 in the front waist region 22 as illustrated in Figs. 1 and 2. The fold line 92 extends in a lateral direction through the crotch region 26 of the diaper 20. Desirably, each diaper 20 is consistently folded about

fold line 92 such that the waist edges 32 of the diaper 20 in the front and back waist region 22 and 24 align with each other.

Suitable blade folders to provide the folding are well known to those skilled in the art. For example, as illustrated in Fig. 1, the blade folder 90 may include a pair of rotating folding blades which are configured to contact the diaper 20 along the fold line 92. In such a configuration, the rotation of the folding blades force the diaper into a nip between two rotating rolls causing the diaper 20 to fold about the fold line 92.

As illustrated in Fig. 1, the waist regions 22 and 24 are maintained in the facing relationship by passing the diaper 20 through another bonder 94 which may be similar to bonder 100. The bonder 94 permanently bonds and secures the side portions 70 of the side panels 28 to the side edges 30 of the diaper 20 in the respective waist region 22 or 24 along attachment line 72 to provide the prefastened diaper 20 as representatively illustrated in Fig. 2. Desirably, the bonder 94 is also an ultrasonic bonder for improved efficiency and cost effectiveness. Suitable bonders for permanently bonding and securing the side panels 28 to the side edges 30 of the diaper 20 are described above as being suitable for bonder 100 and may include bonding roll 96 and anvil roll 98. Suitable bond patterns are also described above. Desirably, the bond pattern used along attachment line 72 is continuous for improved strength.

The methods of the present invention, as representatively illustrated in Figs. 1 and 2, can reliably and consistently provide prefastened absorbent articles having separate and distinct side panels such as the diaper illustrated in Figs. 3-5. Since the side panels 28 are individually applied to the outer surface 36 of the diaper 20 in the front waist region instead of being first attached to the side edges of the diaper in the opposite waist region, it is not necessary to fold the side panels over to engage the outer surface. Such a configuration can result in improved control of the location and placement of the primary fasteners and reduce the complexity of the equipment needed.

The absorbent articles made by the methods of the present invention may be manufactured from a variety of materials. For example, as representatively illustrated in Figs. 3-5, the outer cover 42 of the diaper 20 may suitably be composed of a material which is either liquid permeable or liquid impermeable. Since the absorbent chassis 44 of



the different aspects of the present invention is designed to contain the body exudates discharged from the wearer, it is generally not necessary that the outer cover 42 be liquid impermeable. For example, the outer cover 42 may include various woven or nonwoven materials such as spunbond material, meltblown material, cotton material, rayon material or combinations thereof such as a spunbond-meltblown-spunbond (SMS) laminate material. The outer cover 42 may otherwise be at least partially liquid impermeable to further prevent any leakage of body exudates. For example, a typical outer cover 42 can be manufactured from a thin plastic film or other flexible liquid-impermeable material, woven or nonwoven fibrous layers, microporous "breathable" materials, elastic materials and combinations thereof.

The absorbent chassis 44 of the diaper 20 is suitably connected to the outer cover 42 to provide the disposable diaper 20. The absorbent chassis 44 may be connected to the outer cover 42 in manners well known to those skilled in the art. For example, the absorbent chassis 44 may be bonded to the outer cover 42 using adhesive, thermal or ultrasonic bonding techniques known to those skilled in the art. Alternatively, the absorbent chassis 44 may be connected to the outer cover 42 using conventional fasteners such as buttons, hook and loop type fasteners, adhesive tape fasteners, and the like. The other components of the diaper 20 may be suitably connected together using similar means.

Desirably, the absorbent chassis 44 is connected to the outer cover 42 only at or adjacent the waist edges 32 of the outer cover 42 thereby creating a front attached portion, a back attached portion and an unattached portion which extends between and connects the attached portions. The unattached portion of the absorbent chassis 44 remains substantially unattached to the outer cover 42 and is generally configured to fit between the legs of the wearer and at least partially cover the lower torso of the wearer when in use. As a result, the unattached portion is generally the portion of the absorbent chassis 44 which is configured to initially receive the body exudates from the wearer. Thus, the absorbent chassis 44 is connected to the outer cover 42 in such a manner to secure the chassis 44 in place while not adversely restricting the movement of the outer cover 42 in use. Alternatively, the absorbent chassis 44 may be attached to the outer cover 42 along the entire longitudinal length of the absorbent chassis 44 or any portion thereof or along only the outer periphery of the absorbent chassis 44.

As representatively illustrated in Fig. 4, the absorbent chassis 44 according to the present invention may include a backsheet 46, a bodyside liner 48 which is connected to the backsheet 46 in a superposed relation, and an absorbent core 50 which is located  
5 between the bodyside liner 48 and the backsheet 46. In alternative configurations wherein the outer cover 42 is at least partially resistant to the flow of liquids therethrough, the backsheet 46 may optionally be omitted from the absorbent chassis 44.

The absorbent chassis 44 is generally conformable and capable of absorbing and  
10 retaining body exudates. The absorbent chassis 44 may have any of a number of shapes and sizes. For example, as representatively illustrated in Fig. 4, the absorbent chassis 44 may be rectangular, I-shaped or T-shaped. The size and absorbent capacity of the absorbent chassis 44 should be compatible with the size of the intended wearer and the fluid loading imparted by the intended use of the diaper 20. Typically, it is desirable that  
15 the absorbent chassis 44 have an absorbent capacity of at least about 300 grams of urine. It is generally preferred that the absorbent chassis 44 be narrower in the crotch region 26 than in the waist regions 22 and 24. It has been found that the absorbent chassis 44 of the present invention is particularly useful when the width dimension in the crotch region 26 is from about 2.5 to about 10.2 centimeters (1.0 to about 4.0 inches),  
20 desirably no more than about 7.6 centimeters (3.0 inches) and more desirably no more than about 5.1 centimeters (2.0 inches). The narrow crotch width dimension of the absorbent chassis 44 allows the absorbent chassis 44 to better fit between the legs of the wearer.

25 The bodyside liner 48 of the absorbent chassis 44, as representatively illustrated in Fig. 4, suitably presents a bodyfacing surface which is intended to be worn adjacent the body of the wearer and is compliant, soft feeling and nonirritating to the wearer's skin. Further, the bodyside liner 48 may be less hydrophilic than the absorbent core 50, to present a relatively dry surface to the wearer, and may be sufficiently porous to be liquid permeable,  
30 permitting liquid to readily penetrate through its thickness. A suitable bodyside liner 48 may be manufactured from a wide selection of web materials, such as woven and nonwoven fabrics, porous foams, reticulated foams, apertured plastic films, natural fibers (for example, wood or cotton fibers), synthetic fibers (for example, polyester or polypropylene fibers), or a combination of natural and synthetic fibers. The bodyside

liner 48 is suitably employed to help isolate the wearer's skin from fluids held in the absorbent core 50 of the absorbent chassis 44.

5 The backsheet 46 of the absorbent chassis 44, as representatively illustrated in Fig. 4, may suitably be composed of a material which is either liquid permeable or liquid impermeable. It is generally preferred that the backsheet 46 be formed from a material which is substantially impermeable to fluids. A typical backsheet can be manufactured from a thin plastic film or other flexible liquid-impermeable material. The backsheet 46 may also be constructed of a material which is similar to the material described as being  
10 suitable for the outer cover 42.

The bodyside liner 48 and backsheet 46 are generally adhered to one another so as to form a pocket in which the absorbent core 50 is located to provide the absorbent chassis 44. The bodyside liner 48 and backsheet 46 may be adhered directly to each  
15 other around the outer periphery of the absorbent chassis 44 by any means known to those skilled in the art such as adhesive bonds, sonic bonds or thermal bonds. For example, a uniform continuous layer of adhesive, a patterned layer of adhesive, a sprayed or meltblown pattern of adhesive or an array of lines, swirls or spots of adhesive may be used to affix the bodyside liner 48 to the backsheet 46. It should be noted that both the  
20 bodyside liner 48 and the backsheet 46 need not extend completely to the outer periphery of the absorbent chassis 44. For example, the backsheet 46 may extend to the outer periphery of the absorbent chassis 44 while the bodyside liner 48 may be attached to the backsheet 46 inboard of the outer periphery of the absorbent chassis 44, or more towards the longitudinal centerline of the diaper 20. In alternative configurations, especially  
25 wherein the backsheet 46 is omitted, the bodyside liner 48 may be suitably adhered directly to the absorbent core 50 or to the outer cover 42.

The absorbent core 50, as representatively illustrated in Fig. 4, is positioned between the bodyside liner 48 and the backsheet 46 to form the absorbent chassis 44. The absorbent  
30 core 50 is desirably conformable and capable of absorbing and retaining body exudates. The absorbent core 50 may have any of a number of shapes and sizes. For example, the absorbent core may be rectangular, I-shaped or T-shaped. It is generally preferred that the absorbent core 50 be narrower in the crotch region 26. The size of the absorbent

core 50 should be compatible with the size of the intended wearer and the desired absorbent capacity of the absorbent chassis 44.

5 The absorbent core 50 of the absorbent chassis 44 may suitably comprise various types of wettable, hydrophilic fibrous materials. Examples of suitable materials include naturally occurring organic fibers composed of intrinsically wettable material, such as cellulosic fibers; synthetic fibers composed of cellulose or cellulose derivatives, such as rayon fibers; inorganic fibers composed of an inherently wettable material, such as glass fibers; synthetic fibers made from inherently wettable thermoplastic polymers, such as particular  
10 polyester and polyamide fibers; and synthetic fibers composed of a nonwetable thermoplastic polymer, such as polypropylene fibers, which have been hydrophilized by appropriate means known to those skilled in the art. The absorbent core 50 may also comprise selected blends of the various types of fibers mentioned above.

15 In a particular aspect of the invention, the absorbent core 50 may include a matrix of hydrophilic fibers, such as a web of cellulosic fibers, mixed with particles of a high-absorbency material such as that commonly known as superabsorbent material. As used herein, the term "high-absorbency material" refers to materials that are capable of absorbing at least 10 times their own weight in liquid. In a particular embodiment, the  
20 absorbent core 50 comprises a mixture of superabsorbent hydrogel-forming particles and wood pulp fluff. The wood pulp fluff may be exchanged with synthetic, polymeric, meltblown fibers or with a combination of meltblown fibers and natural fibers. The high-absorbency material may be substantially homogeneously mixed with the hydrophilic fibers or may be nonuniformly mixed. The high-absorbency material may also be  
25 arranged in a generally discrete layer within the matrix of hydrophilic fibers. Alternatively, the absorbent core 50 may comprise a laminate of fibrous webs and high-absorbency material or other suitable means of maintaining a high-absorbency material in a localized area.

30 As representatively illustrated in Fig. 4, the absorbent chassis 44 of the disposable diaper 20 may include a pair of containment flaps 54 which are configured to provide a barrier to the lateral flow of body exudates. The containment flaps 54 may be located along the laterally opposed side edges of the absorbent chassis 44. Each containment flap 54 typically defines an unattached edge which is configured to maintain an upright,

- perpendicular configuration in at least the crotch region 26 of the diaper 20 to form a seal against the wearer's body. The containment flaps 54 may extend longitudinally along the entire length of the absorbent chassis 44 or may only extend partially along the length of the absorbent chassis 44. When the containment flaps 54 are shorter in length than the
- 5 absorbent chassis 44, the containment flaps 54 can be selectively positioned anywhere along the side edges of the absorbent chassis 44. In a particular aspect of the invention, the containment flaps 54 extend along the entire length of the absorbent chassis 44 to better contain the body exudates.
- 10 Such containment flaps 54 are generally well known to those skilled in the art. For example, suitable constructions and arrangements for containment flaps 54 are described in U.S. Patent 4,704,116 issued November 3, 1987, to K. Enloe the disclosure of which is hereby incorporated by reference.
- 15 The disposable diaper 20 of the different aspects of the present invention may further include elastics at the waist edges 32 and side edges 30 of the diaper 20 to further prevent the leakage of body exudates and support the absorbent chassis 44. For example, as representatively illustrated in Fig. 4, the diaper 20 of the present invention may include a pair of leg elastic members 52 which are connected to the laterally opposed
- 20 side edges 30 in the crotch region 26 of the diaper 20 and a pair of waist elastic members 56 which are connected to the longitudinally opposed waist edges 32 of the diaper 20. The leg elastics 52 and waist elastics 56 are generally adapted to fit about the legs and waist of a wearer in use to maintain a positive, contacting relationship with the wearer to effectively reduce or eliminate the leakage of body exudates from the diaper 20.
- 25 Materials suitable for use as the leg elastics 52 and waist elastics 56 are well known to those skilled in the art. Exemplary of such materials are sheets or strands or ribbons of a polymeric, elastomeric material which are adhered to the outer cover 42 in a stretched position, or which are attached to the outer cover 42 while the outer cover is pleated, such
- 30 that elastic constrictive forces are imparted to the outer cover 42. The leg elastics may also include such materials as polyurethane, synthetic and natural rubber.

As representatively illustrated in Figs. 3-5 and described with respect to the method aspects of the invention, the diaper 20 further includes a pair of laterally opposed side

panels 28 connected to the side edges 30 of the diaper 20 in one of the waist regions 22 and 24. For example, as illustrated in Figs. 4 and 5, the side panels 28 of the diaper 20 are permanently secured to and extend laterally beyond the side edges 30 of the diaper 20 in the back waist region 24 of the diaper 20. The side panels 28 include individual, distinct pieces of material which are connected to the diaper 20 along attachment line 72 using attachment means known to those skilled in the art such as adhesive, thermal or ultrasonic bonding. As discussed above, the side panels 28 are desirably attached to the diaper 20 using ultrasonic bonding for improved manufacturing efficiency and reduced raw material cost.

10

Materials suitable for the side panels 28 of the diaper 20 are generally known to those skilled in the art. For example, suitable materials for the side panels 28 include those materials described above as being suitable for the outer cover 42, backsheet 46 or bodyside liner 48 of the diaper 20 such as woven and nonwoven materials. Desirably, the side panels 28 are elastic or stretchable. For example, the side panels 28 may comprise a stretch-thermal laminate (STL), neck-bonded laminate (NBL), or stretch-bonded laminate (SBL) material. Methods of making such materials are well known to those skilled in the art and described in U.S. Patent No. 4,663,220 issued May 5, 1987 to Wisneski et al., U.S. Patent No. 5,226,992 issued July 13, 1993 to Mormon, and European Patent Application No. EP 0 217 032 published on April 8, 1987 in the names of Taylor et al., the disclosures of which are hereby incorporated by reference.

20

The absorbent article of the different aspects of the present invention further includes a multi-functional fastening system 60 for securing the absorbent article about the waist of the wearer. The multi-functional fastening system 60 includes fasteners located on one of the waist regions 22 and 24 of the diaper 20 which are configured to releasably engage the opposite waist region of the diaper 20 to maintain the diaper about the waist of the wearer. The use of fasteners which are refastenable or releasably engageable allows for ease of securing and removing the diaper 20 from the waist of the wearer without undesirably soiling the wearer.

30

As representatively illustrated in Figs. 3-5, the multi-functional fastening system 60 of the present invention may include a pair of primary fasteners 62 which are located on the side panels 28 of the diaper 20 in the back waist region 24 of the diaper 20. In such a

configuration, the side panels 28 and primary fasteners 62 are configured to encircle the hips of the wearer and engage the outer surface 36 of the front waist region 22 of the diaper 20 to maintain the diaper 20 on the wearer. Alternatively, the side panels 28 and primary fasteners 62 may be located on the front waist region 22 and may be configured to releasably engage the outer surface 36 of the back waist region 24 of the diaper 20. The primary fasteners 62 may be adhered to the side panels 28 by any means known to those skilled in the art such as adhesive bonds, sonic bonds or thermal bonds.

Desirably, the primary fasteners 62 are releasably engageable directly with the outer surface of the outer cover 42 of the diaper 20 to provide improved fit and ease of fastening. Alternatively, as representatively illustrated in Fig. 3, the disposable diaper 20 of the present invention may further include an attachment panel 66 located on the outer cover 42 in one of the waist regions 22 and 24 of the diaper 20. In such a configuration, the primary fasteners 62 are releasably engageable with the attachment panel 66 to maintain the diaper 20 about the waist of the wearer. When the primary fasteners 62 are releasably engaged, the side edges 30 of the diaper 20 define leg openings which are configured to encircle the legs of the wearer and the waist edges 32 define a waist opening which is configured to encircle the waist of the wearer. As illustrated in Fig. 5, the attachment panel 66 may include two separate panels located along the opposite side edges in one of the waist regions 22 and 24 of the diaper 20. Alternatively, the attachment panel 66 may include a single piece of material which extends substantially across the respective waist region of the diaper 20.

In the different aspects of the present invention, the primary fasteners 62 are releasably engaged with the outer surface of the opposite waist region 22 and 24 of the diaper 20 before the diaper 20 is placed on the wearer to provide a prefastened diaper. In such a configuration, the prefastened diaper 20 can be pulled on or off over the legs and hips of the wearer. If the diaper 20 becomes soiled during use, the primary fasteners 62 can be disengaged to easily remove the diaper 20 from the waist of the wearer with reduced risk of undesirably soiling the clothes or legs of the wearer. Thus, the diaper 20 is configured to be pulled on or off over the hips of the wearer such as conventional training pants and can be readily applied or removed by disengaging the fasteners similar to conventional diaper articles.

- Suitable fasteners are well known to those skilled in the art and can include adhesive tape tab fasteners, hook and loop fasteners, mushroom fasteners, snaps, pins, belts and the like, and combinations thereof. For example, as representatively illustrated in Fig. 4, the primary fasteners 62 may be hook type fasteners and the outer cover 42 or attachment panel 66 may be configured to function as a complimentary loop type fastener. Desirably, the fasteners 62 are hook type fasteners which are releasably engageable directly with the outer cover 42. Such an arrangement provides the ability to vary the size of the waist opening in very small increments over a wide range to fit the waist of the wearer.
- 10 The multi-functional fastening system 60 on the disposable diaper 20 of the present invention may further include at least one secondary fastener (not shown) to provide improved securement of the diaper 20 about the waist of the wearer when the primary fasteners 62 are releasably engaged. Such a secondary fastener can be configured to further conform the waist regions 22 and 24 of the diaper 20 to the waist of the wearer. A
- 15 suitable arrangement for such secondary fasteners is described in U.S. Patent Application Serial Number 08/907,585 entitled "A MULTI-FUNCTIONAL FASTENER FOR DISPOSABLE ABSORBENT ARTICLES" and filed August 8, 1997 in the name of J. Suprise.
- 20 The use of such secondary fasteners has been found to be particularly desirable since the primary fasteners 62 are releasably engaged with the respective waist region of the diaper 20 prior to use. In such a configuration, the waist opening of the diaper 20 when the primary fasteners 62 are engaged must be sufficient to allow the prefastened
- 25 diaper 20 to be pulled over the hips of the wearer. However, the circumference of the waist of the wearer is typically less than the circumference around the hips of the wearer. Thus, the waist opening of the prefastened diaper 20 may not conform to the waist of the wearer which may undesirably result in leaks. In such a configuration, the secondary fastener of the diaper 20 is configured to conform the waist regions of the diaper 20 to the wearer by reducing the waist perimeter dimension of the diaper 20 after the prefastened
- 30 diaper is pulled on the wearer. Thus, the care giver is not required to reposition the primary fasteners 62 to conform the waist regions 22 and 24 to the waist of the wearer. As a result, when the diaper 20 is to be removed from the wearer, the care giver may simply disengage the secondary fastener if necessary and pull the prefastened diaper down over the hips and legs of the wearer without having to reposition the primary



fasteners 62. Alternatively, if the diaper 20 does not include such secondary fasteners, the primary fasteners 62 can be repositioned if necessary after the prefastened diaper 20 has been pulled on over the legs and hips of the wearer.

- 5 As described above in connection with the method aspects of the invention, the prefastened absorbent article of the present invention further includes a pair of releasable side bonds 64 for improved reliability of maintaining the article in the prefastened condition particularly when it is being pulled on or off over the hips of the wearer. Absorbent articles including such releasable side bonds are further described in U.S. Patent Application
- 10 entitled "DISPOSABLE ABSORBENT ARTICLES HAVING PASSIVE SIDE BONDS AND ADJUSTABLE FASTENING SYSTEMS" filed in the name of Elsberg on the same date as the instant application and having Attorney Docket No. 13,611, the disclosure of which is hereby incorporated by reference.
- 15 For example, as representatively illustrated in Fig. 3, the diaper 20 may include a pair of releasable side bonds 64 which releasably connect side panels 28 to the front waist region 22 of the diaper 20. In such a configuration, the releasable side bonds 64 assist the fastening system 60 in maintaining the diaper 20 in a prefastened condition as the diaper 20 is pulled up or down over the hips of the wearer. Moreover, the releasable side
- 20 bonds 64 prevent movement and shifting of the waist regions 22 and 24 and side panels 28 relative to each other for improved fit and performance. The releasable side bonds 64 also prevent rollover or folding of the side edges 30 and waist edges 32 of the prefastened diaper 20 as it is pulled over the wearers hips.
- 25 In the illustrated embodiments, the releasable side bonds 64 connect the respective side panel 28 and front waist region 22 in a facing relationship. As described above, the releasable side bonds 64 can be provided by any type of bonding such as thermal, adhesive and ultrasonic bonding as are well known to those skilled in the art and may be discrete point bonds, dashed lines, continuous lines, discontinuous lines and the like or
- 30 combinations thereof. Moreover, the side bonds 64 may have any shape such as circular, square, triangular and the like. Desirably, the releasable side bonds 64 are ultrasonic point bonds for improved manufacturing efficiency.

In certain aspects of the invention, the location of the side bonds 64 and the respective distance 68 (Fig. 2) can be selectively varied to tailor the fit of the diaper 20 for different sized wearers. For example, the location of the bonds 64 may be varied during the manufacturing process such that the same process can produce prefastened diapers for use in conventional Step 3 or Step 4 sizes.

The releasable side bonds 64 are configured to assist the primary fasteners 62 in maintaining the diaper 20 in a prefastened configuration as the diaper 20 is pulled on and off over the hips of the wearer and during use. Thus, it is desirable that the releasable side bonds 64 provide adequate shear strength for assisting the primary fasteners 62. For example, in a particular embodiment, the releasable side bonds 64 define a shear strength of at least about 50 grams and desirably at least about 100 grams. For example, the passive side bonds 80 and 82 may define a shear strength of from about 100 to about 4000 grams and desirably from about 500 to about 2000 grams. As used herein, the term "shear strength" refers to the value obtained when subjecting the side bonds to the Shear Strength Test described herein. Shear strength values less than those described above may not prevent the separation of the front and rear waist regions 22 and 24 from each other during the application and use of the diaper 20.

The releasable side bonds 64 are also configured to be readily tearable such that the caregiver can easily peelingly remove the diaper 20 from the wearer after it has been soiled. Thus, it is desirable that the releasable side bonds 64 define a relatively low peel strength such that the caregiver can readily disengage the fasteners 62, break the releasable side bonds 64 and separate the front and back waist regions 22 and 24 to remove the diaper 20 from the waist of the wearer similar to conventional diapers which are not prefastened. For example, in a particular embodiment, the releasable side bonds 64 define a peel strength of no more than about 1500, desirably no more than about 1000 grams and more desirably no more than about 800 grams. As used herein, the term "peel strength" refers to the value obtained when subjecting the side bonds to the Peel Strength Test described herein. Peel strength values greater than those described above may not be readily tearable and may undesirably result in tearing of other portions of the diaper 20.

The different aspects of the present invention advantageously provide methods of making a prefasted disposable absorbent article which includes the combination of releasable or releasable side bonds and an adjustable fastening system. The fastening system is prefasted to releasably engage the front and back waist portions to allow the absorbent article to be pulled up or down over the hips of the wearer such as conventional training pants. Moreover, the fastening system can be used to releasably engage and adjust the front and back waist portions of the absorbent article to maintain the absorbent article about the waist of the wearer after the article has been pulled on in a similar manner to conventional diapers. The releasable side bonds assist the fastening system in maintaining the article in a prefasted condition as the article is pulled up or down over the hips of the wearer. Moreover, the releasable side bonds prevent movement and shifting of the waist portions relative to each other for improved manufacturability, fit and performance. The releasable side bonds also prevent the rollover or folding on the side and waist edges of the prefasted absorbent article as it is pulled over the wearers hips.

As a result, the absorbent article of the present invention is designed to conform to the body of the wearer to effectively contain bodily exudates while still being capable of being reliably pulled up or down over the hips of the wearer to assist in the toilet training of the wearer. Moreover, similar to conventional diapers, the absorbent article of the present invention can advantageously be applied to and removed from the wearer with relative ease and cleanliness.

#### Peel Strength Test

This test method is designed to quantify, in grams, the peak strength of the ultrasonic point bonds holding the front waist region of the absorbent article to the rear waist region. The direction of removal (peel), in this application, is that direction in which the fastener material would generally be removed from a substrate when the product is in use. This direction is generally perpendicular to a longitudinal centerline of the product.

#### Equipment

1. Tensile tester capable of obtaining a peak load and equipped with an appropriate load cell. A suitable tensile testing system is a Sintech Tensile Tester, commercially available from MTS Sintech, Research Triangle Park, North Carolina, under the trade designation Instron Model 4201 Tensile Tester with Sintech QAD (Quality Assurance Department) Software.

2. Software commercially obtained from MTS Sintech under the trade designation Sintech Testworks™.
3. Pneumatic-action grips commercially available from Instron Corporation, Canton, Massachusetts, under the trade designation "Instron Model 2712-004."
- 5 4. 1 by 4 inch grip faces, serrated, commercially available from Instron Corporation, Canton, Massachusetts.
5. Test facility having a temperature of  $23 \pm 1^{\circ}\text{C}$ , and a relative humidity of  $50 \pm 2$  percent.

#### 10 Test Procedure

1. A sample to be tested is conditioned in the test facility for at least 4 hours prior to testing.
2. The load cell is calibrated and the software loaded.
3. The grips are installed on the tensile tester with the jaws closed.
- 15 4. The test condition for the tensile tester are set as follows:  
Crosshead speed: 500 millimeters/minute  
Full-scale load: 5 kilograms  
Threshold: 5 percent  
Fail criterion: 95 percent  
20 Gage length: 50 millimeters
5. The weight of the clamp is tared out.
6. The primary fastener tab of the fastening element on the back waist region of the article is inserted into the upper jaw such that the edge of the grip face is flush with the inner edge of the hook material.
- 25 7. The front waist region of the article is inserted into the lower jaw such that the inner surface of the back waist region and the outer surface of the front waist region form a  $180^{\circ}$  angle. The lower jaw is closed.
8. The crosshead is started in motion.
9. The peak load of failure is recorded. It is intended that the mode of failure is that  
30 the back waist region of the diaper separates from the front waist region of the diaper. Results are rejected if the place of failure is any location other than the ultrasonic point bonds.

### Shear Strength Test

This test method is designed to quantify, in grams, the peak dynamic shear strength of the ultrasonic point bonds holding the front waist region of the absorbent article to the rear waist region. The direction of force in this application is generally perpendicular to the longitudinal centerline of the product.

### Equipment

1. Tensile tester capable of obtaining a peak load and equipped with an appropriate load cell. A suitable tensile testing system is a Sintech Tensile Tester, commercially available from MTS Sintech, Research Triangle Park, North Carolina, under the trade designation Instron Model 4201 Tensile Tester with Sintech QAD (Quality Assurance Department) Software.
2. Software commercially obtained from MTS Sintech under the trade designation Sintech Testworks™.
3. Pneumatic-action grips commercially available from Instron Corporation, Canton, Massachusetts, under the trade designation "Instron Model 2712-004."
4. 1 by 4 inch grip faces, serrated, commercially available from Instron Corporation, Canton, Massachusetts.
5. Test facility having a temperature of  $23 \pm 1^{\circ}\text{C}$ , and a relative humidity of  $50 \pm 2$  percent.

Test Procedure

1. A sample to be tested is conditioned in the test facility for at least 4 hours prior to testing.
2. The load cell is calibrated and the software loaded.
- 5 3. The grips are installed on the tensile tester with the jaws closed.
4. The test condition for the tensile tester are set as follows:
 

Crosshead speed:	500 millimeters/minute
Full-scale load:	5 kilograms
Threshold:	5 percent
10 Fail criterion:	95 percent
Gage length:	50 millimeters
5. The weight of the clamp is tared out.
6. The primary fastener tab of the fastening element on the back waist region of the article is inserted into the upper jaw such that the edge of the grip face is flush with
   
15 the inner edge of the hook material.
7. The front waist region of the article is inserted into the lower jaw such that the inner surface of the back waist region and the inner surface of the front waist region are facing the same direction and are parallel to one another. The lower jaw is closed.
8. The crosshead is started in motion.
- 20 9. The peak load of failure is recorded. It is intended that the mode of failure is that the back waist region of the article separates from the front waist region of the article. Results are rejected if the place of failure is any location other than the ultrasonic point bonds.
  
- 25 While the invention has been described in detail with respect to specific aspects thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of and equivalents to these aspects. Accordingly, the scope of the present invention should be assessed as that of the appended claims and any equivalents thereto.

I claim:

1. A method of making a prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects said waist regions, a pair of opposed side edges and a pair of opposed waist edges, said method comprising:

- 5           a) providing a continuous web of interconnected absorbent articles;
  - b) releasably attaching a pair of opposed side panels to one of said waist regions on each of said absorbent articles wherein each of said opposed side panels includes a primary fastener thereon which releasably engages said one waist region to provide said releasably attachment and wherein each of said side panels defines side portions which  
10       extend laterally outward beyond said side edges of said absorbent article in said one waist region;
  - c) selectively cutting said continuous web into discrete absorbent articles;
  - d) folding each of said discrete absorbent articles about a fold line extending in a lateral direction through said crotch region of said article thereby positioning said waist  
15       regions in a facing relationship; and
  - e) securing said side portions of said side panels to said side edges of said absorbent article in said opposite waist region to provide said prefastened absorbent article.
2. The method of claim 1 wherein said primary fasteners are hook type fasteners.
3. The method of claim 1 wherein said primary fasteners are releasably engaged to said front waist region to releasably attach said side panels to said front waist region.
4. The method of claim 1 wherein said side portions of said side panels are secured to said side edges of said absorbent article in said opposite waist region using ultrasonic bonding.
5. The method of claim 1 wherein said primary fasteners on said side panels are releasably engaged to said outer surface of said absorbent article before said side portions of said side panels are secured to said side edges of said absorbent article in said opposite waist region.

6. The method of claim 1 and further comprising releasably bonding said side panels to said one waist region to assist said primary fasteners in providing said releasable attachment of said side panels to said one waist region.

7. The method of claim 6 wherein said side panels are releasably bonded to said one waist region before said side portions of said side panels are secured to said side edges of said absorbent article in said opposite waist region.

8. The method of claim 6 wherein said side panels are releasably bonded to said one waist region using at least two releasable point bonds.

9. The method of claim 6 wherein said side panels are releasably bonded to said side edges of said absorbent article in said one waist region.

10. The method of claim 6 wherein said side panels are releasably bonded to said one waist region at a location on said one waist region laterally outward from said primary fasteners.

11. The method of claim 10 wherein said side panels are releasably bonded to said one waist region at a location on said one waist region laterally outward from said primary fastener a distance of at least about 1.0 centimeters.

12. The method of claim 6 wherein said side panels are releasably bonded to said one waist region using ultrasonic bonding.

13. The method of claim 6 wherein said side panels are releasably bonded to said one waist region to define a peel strength of no more than about 1500 grams.

14. A method of making a prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects said waist regions, a pair of opposed side edges and a pair of opposed waist edges, said method comprising the steps of:

- 5           a) providing a continuously moving web of outer cover material;



b) intermittently connecting multiple absorbent chassis to said outer cover material to provide a continuously moving web of interconnected absorbent articles each of which includes one of said absorbent chassis;

10 c) releasably attaching a pair of opposed side panels to said front waist region on each of said absorbent articles wherein each of said opposed side panels includes a primary fastener thereon which releasably engages an outer surface of said absorbent article in said front waist region to provide said releasable attachment and wherein each of said side panels defines side portions which extend laterally outward beyond said side edges of said absorbent article in said front waist region;

15 d) releasably bonding said side panels to said front waist region to assist said primary fasteners in providing said releasable attachment of said side panels to said front waist region;

e) selectively cutting said continuous web of interconnected absorbent articles into discrete absorbent articles;

20 f) folding each of said discrete absorbent articles about a fold line extending in a lateral direction through said crotch region of said absorbent article thereby positioning said waist regions of said absorbent article in a facing relationship; and

g) securing said side portions of said side panels to said side edges of said absorbent article in said back waist region to provide said prefastened absorbent article.

15. The method of claim 14 wherein said primary fasteners are hook type fasteners.

16. The method of claim 14 wherein said primary fasteners on said side panels are releasably engaged to said outer surface of said absorbent article before said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region.

17. The method of claim 16 wherein said side panels are releasably bonded to said front waist region of said absorbent article before said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region.

18. The method of claim 14 wherein said step of folding said absorbent article about said fold line comprises folding said absorbent article to position said opposed waist edges of said absorbent article in alignment with each other.

19. The method of claim 14 wherein said step of releasably bonding comprises releasably bonding said side panels to said front waist region using at least two releasable point bonds located along each of said side edges of said absorbent article in said front waist region.

20. The method of claim 14 wherein said step of releasably bonding comprises releasably bonding said side panels to said side edges of said absorbent article in said front waist region at a location on said side panels laterally outward from said primary fasteners.

21. The method of claim 20 wherein said side panels are releasably bonded to said front waist region at a location on said side panels laterally outward from said primary fasteners a distance of at least about 1.0 centimeters.

22. The method of claim 14 wherein said step of releasably bonding comprises ultrasonic bonding.

23. The method of claim 22 wherein said ultrasonic bonding comprises passing said folded absorbent article between a rotary ultrasonic horn and an anvil roll.

24. The method of claim 14 wherein said step of releasably bonding said side panels to said front waist region provides a peel strength between said side panels and said front waist region of no more than about 1500 grams.

25. The method of claim 14 wherein said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region using ultrasonic bonding.

26. A prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects said waist regions, a pair of opposed side edges, a pair of opposed waist edges and an absorbent, said absorbent article comprising:

- 5           a) a pair of opposed side panels which define side portions which are attached to said opposed side edges of said back waist region of said absorbent article and which

include a primary fastener located thereon which releasably engages an outer surface of said absorbent article in said front waist region to provide said prefastened absorbent article; and

- 10           b) a pair of releasable side bonds which are located on said opposed side panels between said primary fastener and said side portion and which releasably connect said side panels to said front waist region to assist in maintaining said prefastened absorbent article in a prefastened condition.

27. The prefastened absorbent article of claim 26 wherein said side portions of said side panels are ultrasonically bonded to said side edges of said back waist region.

28. The prefastened absorbent article of claim 26 wherein said prefastened absorbent article is made by a process which comprises:

- a) releasably engaging said primary fastener on each of said opposed side panels to said outer surface of said absorbent article in said front waist region;
- 5           b) releasably bonding said side panels to said front waist region to assist said primary fasteners in providing said releasable attachment of said side panels to said front waist region;
- c) folding said absorbent article about a fold line extending in a lateral direction through said crotch region of said absorbent article thereby positioning said waist regions
- 10          in a facing relationship; and
- d) securing said side portions of said side panels to said side edges of said absorbent article in said back waist region to provide said prefastened absorbent article.

29. The prefastened absorbent article of claim 28 wherein said primary fasteners on said side panels are releasably engaged to said outer surface of said absorbent article before said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region.

30. The prefastened absorbent article of claim 28 wherein said side panels are releasably bonded to said front waist region before said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region.

31. The prefastened absorbent article of claim 26 wherein said primary fasteners are hook type fasteners.

32. The prefastened absorbent article of claim 26 and further comprising at least one attachment panel which is located on said outer surface of said absorbent article in said front waist region wherein said primary fasteners releasably engage said attachment panel.

33. The prefastened absorbent article of claim 26 wherein said releasable side bonds connect said side panels to said side edges of said absorbent article in said front waist region to assist in maintaining said prefastened absorbent article in said prefastened condition.

34. The prefastened absorbent article of claim 26 wherein said releasable side bonds are located on said side panels laterally outward from said primary fasteners a distance of at least about 1.0 centimeters.

35. The prefastened absorbent article of claim 26 wherein said releasable side bonds include at least one point bond.

36. The prefastened absorbent article of claim 35 wherein said at least one point bond is an ultrasonic point bond.

37. The prefastened absorbent article of claim 26 wherein said releasable side bonds define a peel strength of no more than about 1500 grams.

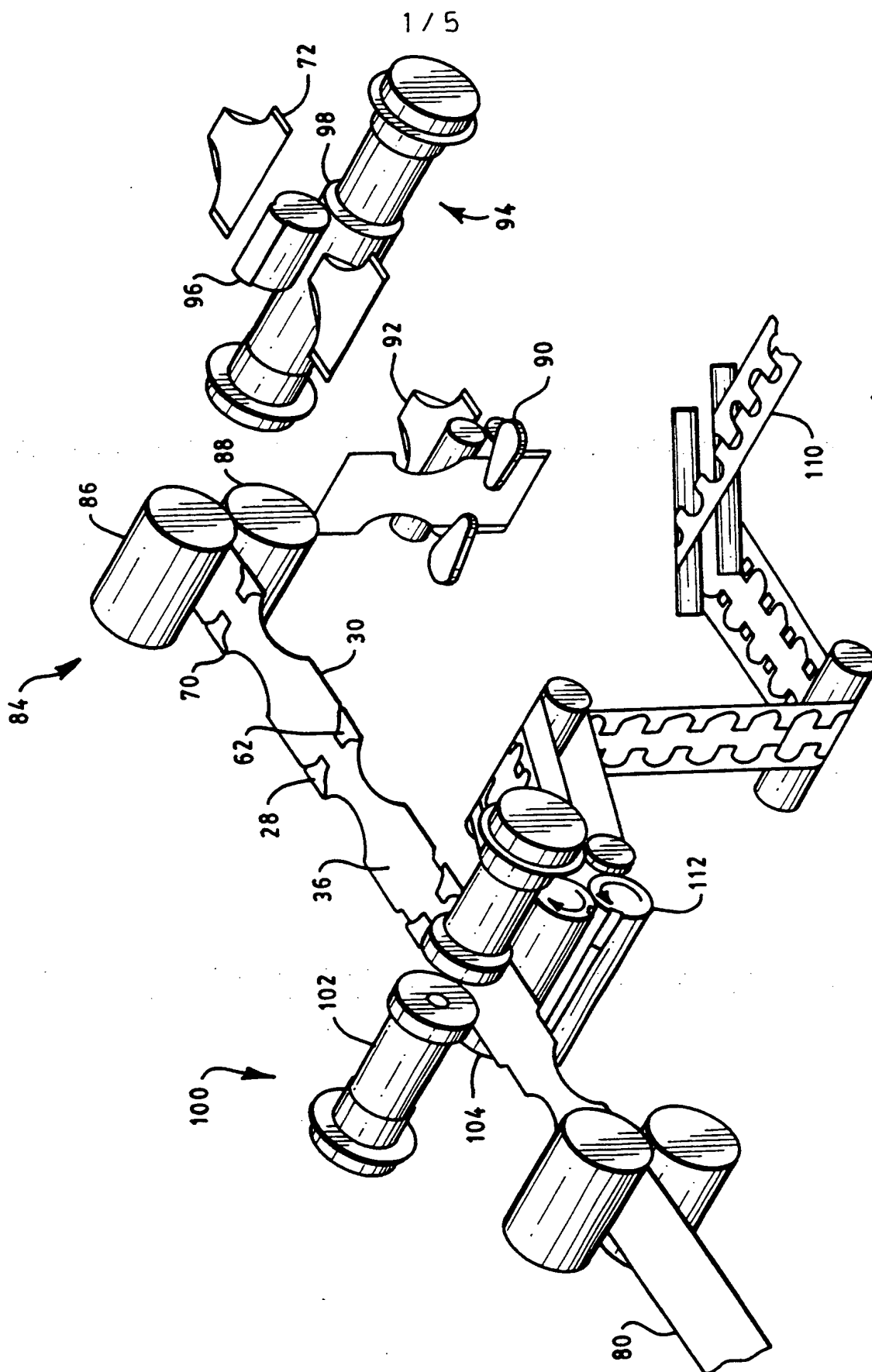
38. The prefastened absorbent article of claim 26 and further comprising an outer cover and an absorbent chassis connected to said outer cover.

39. The prefastened absorbent article of claim 38 wherein said primary fasteners on said side panels releasably engage said outer cover of said absorbent article.

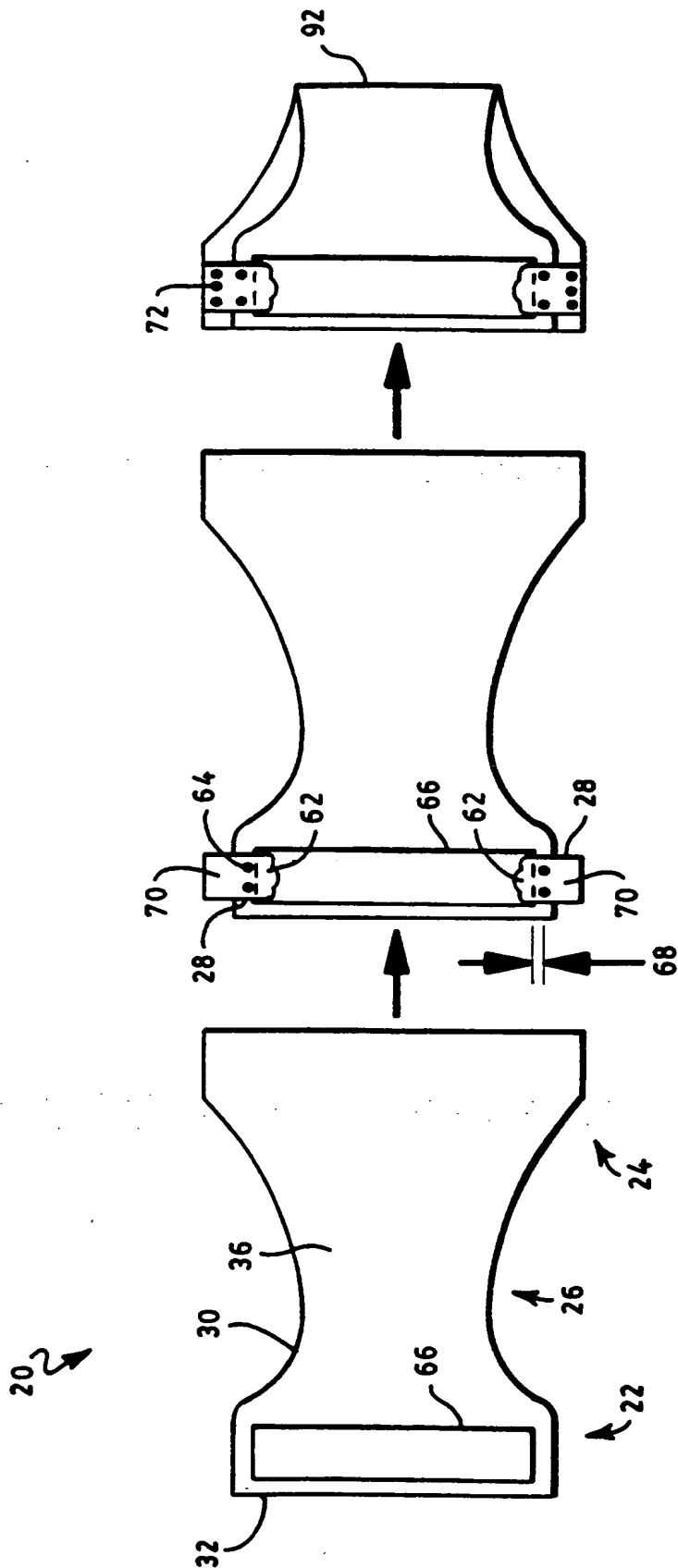
40. A prefastened disposable absorbent article which defines a front waist region, a back waist region, a crotch region which extends between and connects said waist regions, a

- pair of opposed side edges, a pair of opposed waist edges and an absorbent, said absorbent article comprising a pair of opposed side panels which define side portions
- 5 which are attached to said opposed side edges of said back waist region of said absorbent article and which include a primary fastener located thereon which releasably engages an outer surface of said absorbent article in said front waist region to provide said prefastened absorbent article, wherein said prefastened absorbent article is made by a process which comprises:
- 10 a) releasably engaging said primary fastener on each of said opposed side panels to said outer surface of said absorbent article in said front waist region;
- b) folding said absorbent article about a fold line extending in a lateral direction through said crotch region of said absorbent article thereby positioning said waist regions in a facing relationship; and
- 15 c) securing said side portions of said side panels to said side edges of said absorbent article in said back waist region to provide said prefastened absorbent article.

41. The prefastened absorbent article of claim 40 wherein said primary fasteners on said side panels are releasably engaged to said outer surface of said absorbent article before said side portions of said side panels are secured to said side edges of said absorbent article in said back waist region.



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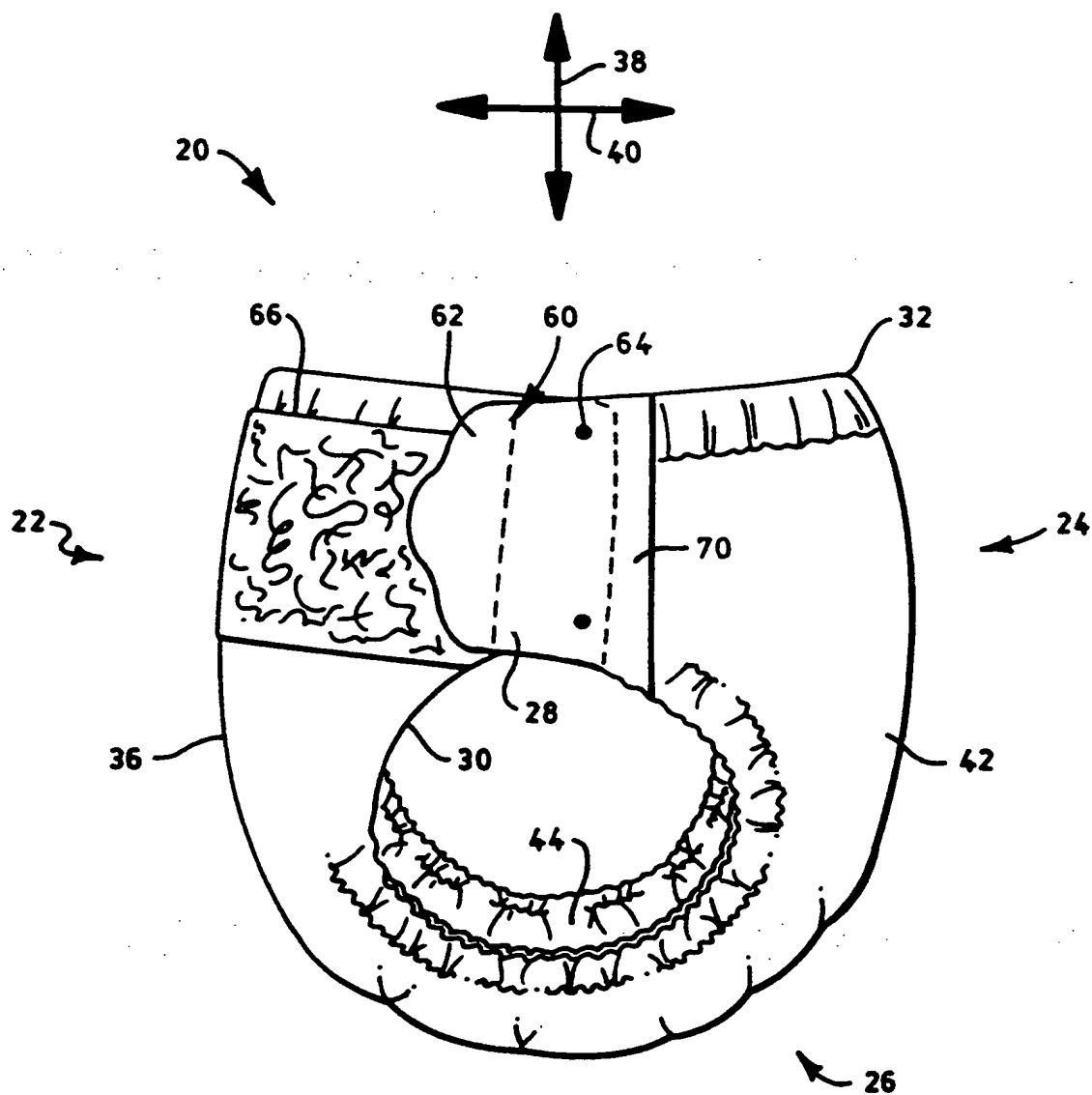
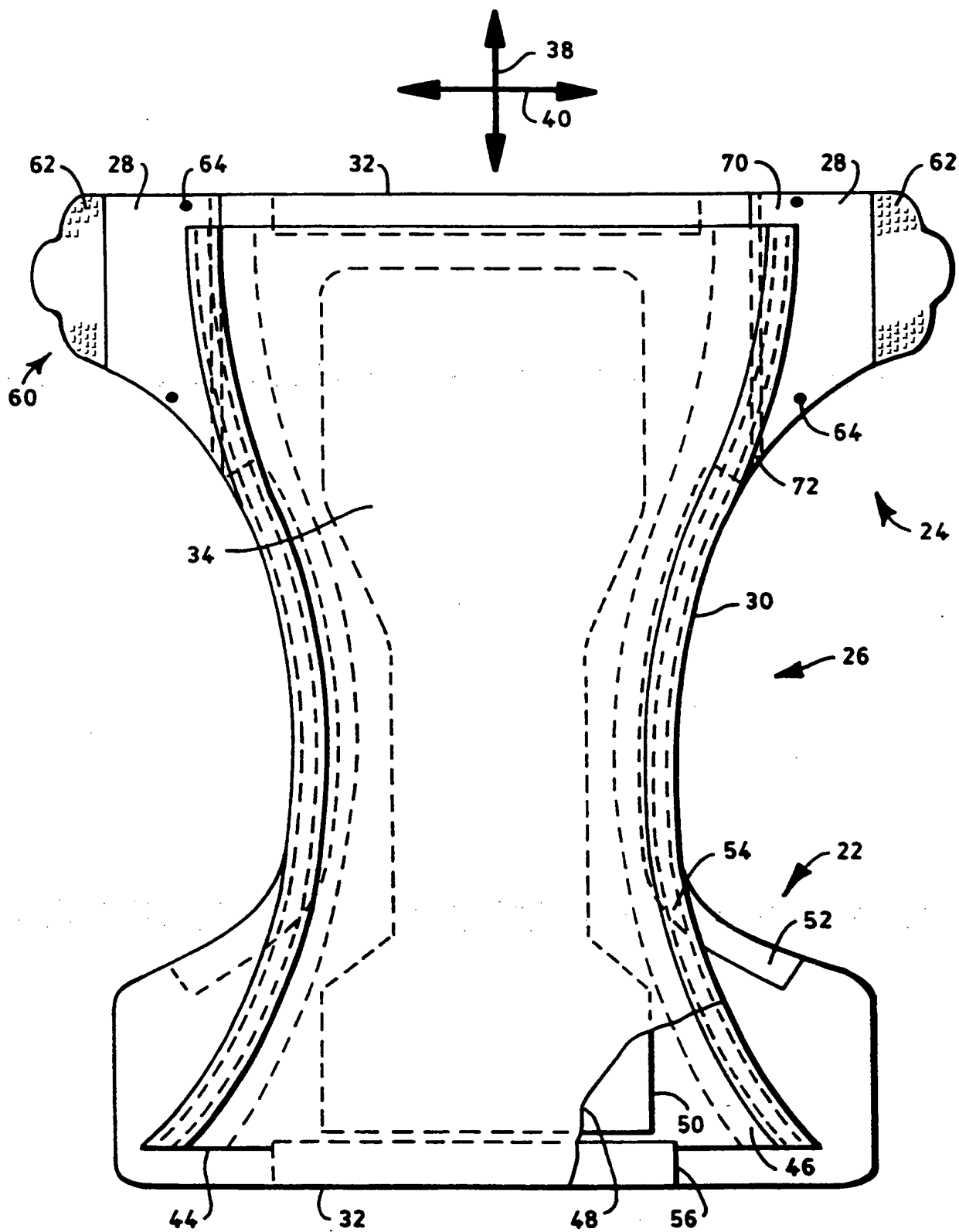


FIG. 3



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**FIG. 4**

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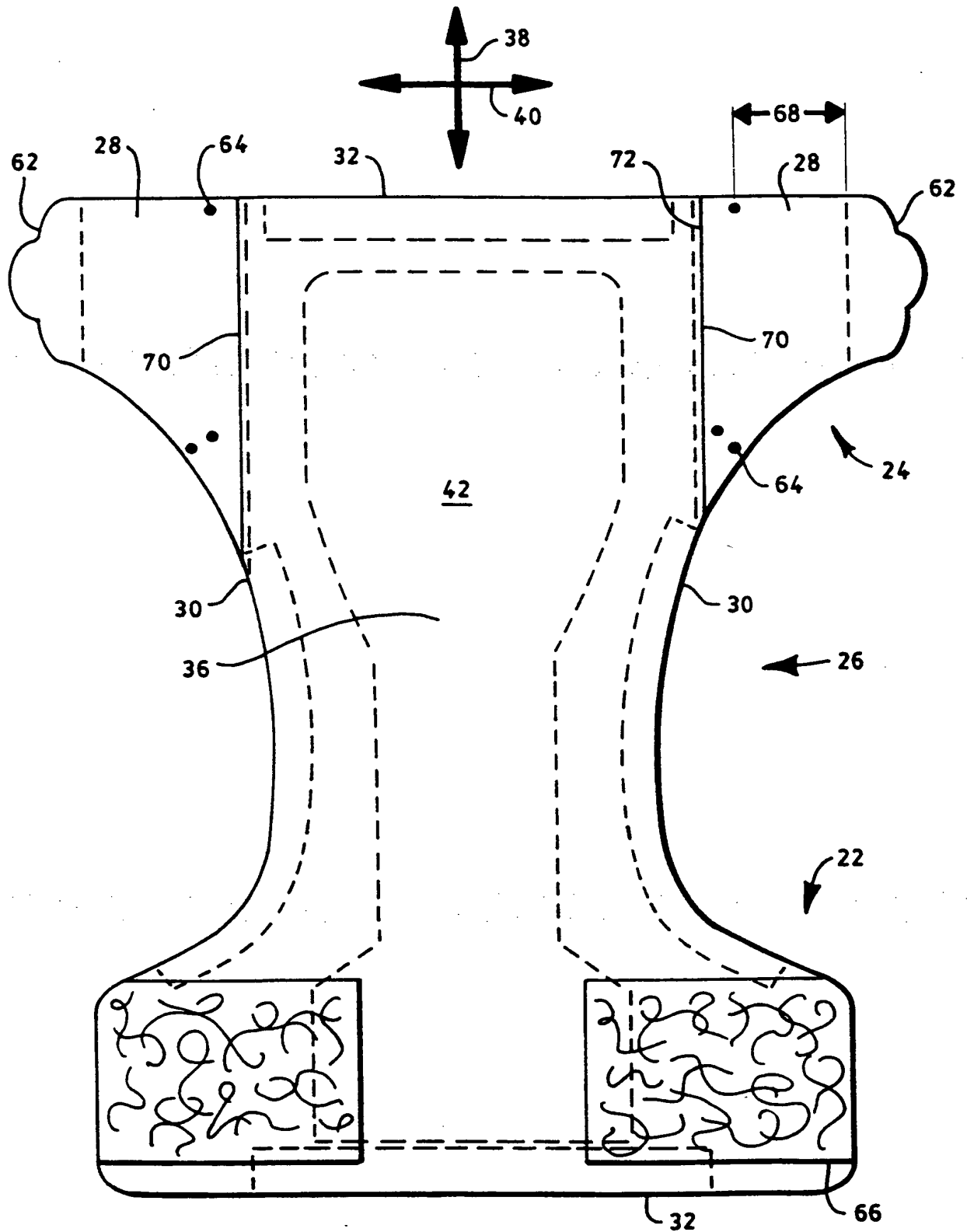


FIG. 5

# INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/US 99/01061

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 570 980 A (UNI CHARM CORP) 24 November 1993 see abstract; claims; figures ---	1-41
A	US 5 399 219 A (ROESSLER THOMAS H ET AL) 21 March 1995 see abstract; claims; figures ---	1-41
A	US 5 370 634 A (ANDO KENJI ET AL) 6 December 1994 ---	
A	WO 96 03952 A (KIMBERLY CLARK CO) 15 February 1996 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
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Date of the actual completion of the international search

27 April 1999

Date of mailing of the international search report

06/05/1999

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. J. Application No

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